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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/993,087

11/06/2001

Jay R. Walton

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10/05/2004

Qualcomm Incorporated
Patents Department
5775 Morehouse Drive
San Diego, CA 92121-1714

EXAMINER

CONTEE, JOY KIMBERLY

ART UNIT

PAPER NUMBER

2686

DATE MAILED: 10/05/2004

7

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/993,087

Applicant(s)

WALTON ET AL.

Examiner

Joy K Contee

Art Unit

2686

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 November 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-53 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-53 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 4 and 5.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Double Patenting

1. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

2. Claims 1-49 and 51-53 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1,42 43 and 44 of copending Application No. 09/956,449 ('449). Although the conflicting claims are not identical, they are not patentably distinct from each other because the same invention is described although '449 claims a transmitter and receiver unit transmitting data there between in a multiple-input multiple-output (MIMO) communication system and method (see independent claims 1,42 and 43). The instant invention claims the same except for independent claims 1,43 and 51-53 claim selecting one or more terminals for data transmission. Regarding claim 42 of the instant application, claim 44 of '449 discloses means for processing the plurality of received signals in accordance with a linear spatial processing technique, a space-time processing technique or a full CSI processing technique to provide estimates of

Art Unit: 2686

modulation symbols. The present invention claims wherein the system is configured to transmit data via a plurality of operating modes comprises of a single-user MIMO mode, a multi-user MIMO mode and a mixed mode (see independent claim 42). However, the single-user MIMO utilizes space-timing and the multi-user MIMO utilizes linear spatial and the mixed mode utilizes the full CSI technique combined with the aforementioned.

Omission of element and its function in combination is obvious expedient if remaining elements perform same functions as before. In re KARLSON (CCPA) 136 USPQ 184 (1963).

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-6,8-28,33-45 and 47-53 are rejected under 35 U.S.C. 102(e) as being anticipated by Ling et al. (Ling), U.S. Patent Application Publication No. US 2003/0003880.

Art Unit: 2686

The applied reference has a common inventor/assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference (March 23, 2001), it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

Regarding claim 1, Ling discloses a method for transmitting data in a multiple-access multiple-input multiple-output (MIMO) communication system, comprising:

selecting one or more terminals for data transmission, **see page 5 [0058];**

receiving channel state information (CSI) indicative of channel conditions for the one or more selected terminals, **see page 7 [0075];**

processing data for the one or more selected terminals based on the received CSI to provide a plurality of modulated signals, **see page 7 [0078-0079];**

transmitting the plurality of modulated signals via a plurality of transmit antennas to the one or more selected terminals, **see pages 7-8 [0086].**

Regarding claim 2, Ling discloses the method of claim 1, wherein the system is configurable to transmit data via a plurality of operating modes, **see page 2 [0025].**

Regarding claim 3, Ling discloses the method of claim 2, wherein the plurality of operating modes include a single-user (i.e., relies on space timing MMSE-LE technique) MIMO mode characterized by use of the plurality of transmit antennas for data

Art Unit: 2686

transmission to a single terminal (i.e., reads on front end processor) having a plurality of receive antennas, **see pages 7-8 [0086]**

Regarding claim 4, Ling discloses the method of claim 3, wherein the data transmission to the single terminal in the single-user MIMO mode comprises a plurality of data streams transmitted on the plurality of modulated signals, **see pages 7-8 [0086]**.

Regarding claim 5, Ling discloses the method of claim 2, wherein the plurality of operating modes include a multi-user MIMO mode characterized by use of the plurality of transmit antennas for data transmission to a plurality of terminals collectively having a plurality of receive antennas, **see page 2 [0024]**.

Regarding claim 6, Ling discloses the method of claim 5, wherein one modulated signal is designated for each of the plurality of terminals in the multi-user MIMO mode, **see page 2 [0026]**.

Regarding claim 8, Ling discloses the method of claim 2, wherein the plurality of operating modes include a diversity mode characterized by use of the plurality of transmit antennas for reliable transmission of a single data stream to a single terminal having a plurality of receive antennas, **see page 2 [0025]**.

Regarding claim 9, Ling discloses the method of claim 2, wherein the plurality of operating modes include a transmit diversity mode characterized by use of the plurality of transmit antennas for data transmission to a single terminal having a single receive antenna, **see page 2 [0025]**.

Art Unit: 2686

Regarding claim 10, Ling discloses the method of claim 1, wherein terminals are selected for data transmission based on estimated signal-to-noise-plus-interference ratios (SNRs) achieved for the plurality of transmit antennas, **see page 1 [0012]**.

Regarding claim 11, Ling discloses the method of claim 10, wherein the SNRs are derived at the terminals based on pilots included in the plurality of modulated signals, **see page 10 [0112]**.

Regarding claim 12, Ling discloses the method of claim 1, wherein terminals are selected for data transmission based on RF characterization of a MIMO channel formed by the plurality of transmit antennas and a plurality of receive antennas at the terminals, **see page 1 [0006, 0010]**.

Regarding claim 13, Ling discloses the method of claim 12, wherein the RF characterization is derived at the terminals based on pilots included in the plurality of modulated signals, **see page 10 [0112]**.

Regarding claim 14, Ling discloses the method of claim 1, further comprising: assigning the plurality of transmit antennas to the one or more selected terminals based on the received CSI, **see page 7 [0075]**.

Regarding claim 15, Ling discloses the method of claim 1, further comprising: assigning each selected terminal to one or more transmit antennas, **see pages 7-8, [0086]**.

Regarding claim 16, Ling discloses the method of claim 1, wherein terminals are selected for data transmission based on one or more metrics (i.e., channel conditions or characteristics), **see page 7 [0078]**.

Art Unit: 2686

Regarding claim 17, Ling discloses the method of claim 16, wherein one of the one or more metrics is indicative of throughput achievable for the selected terminals, **see page 7 [0079]**.

Regarding claim 18, Ling discloses the method of claim 16, wherein one of the one or more metrics is a function based on SNR achieved for the selected terminals, **see page 10 [0112]**.

Regarding claim 19, Ling discloses the method of claim 1, wherein terminals are selected for data transmission based on their priorities (i.e., reads on system throughput improvements), **see page 19 [0245-0246]**.

Regarding claim 20, Ling discloses the method of claim 19, wherein the priority of a particular terminal is determined based on an average throughput of the terminal **see page 19 [0245-0246]**.

Regarding claim 21, Ling discloses the method of claim 1, wherein the processing includes coding and modulating the data for the one or more selected terminals based on the received CSI, **see page 7 [0075]**.

Regarding claim 22,, Ling discloses the method of claim 10, further comprising: coding and modulating data for each modulated signal based on estimated SNRs at the terminal for the modulated signal, **see page 10 [0112]**.

Regarding claim 23, Ling discloses the method of claim 12, further comprising: preconditioning modulation symbols based on an eigenvector matrix formed by the RF characterization for the one or more selected terminals, **see pages 2-3 [0029]**.

Art Unit: 2686

Regarding claim 24, Ling discloses the method of claim 1, wherein the processing includes adjusting data rates for the one or more selected terminals based on the received CSI, **see page 4 [0041]**.

Regarding claim 25, Ling discloses the method of claim 1, further comprising: receiving feedback from the one or more selected terminals; and adjusting at least one characteristic of the modulated signals based on the received feedback, **see page 17 [0224]**.

Regarding claim 26, Ling discloses the method of claim 25, wherein transmit power for the modulated signals is adjusted based on the received feedback, **see page 15 [0205-0207]**.

Regarding claim 27, Ling discloses the method of claim 25, wherein data rates for the modulated signals are adjusted based on the received feedback **see page 4 [0041]**.

Regarding claim 28, Ling discloses the method of claim 25, wherein coding and modulation of the data for the modulated signals are adjusted based on the received feedback **see page 7 [0075]**.

Regarding claim 33, Ling discloses the method of claim 1, wherein the CSI comprises estimated signal-to-noise-plus-interference ratios (SNRs) for a plurality of transmission channels used for data transmission, **see page 15 [0205]**.

Regarding claim 34, Ling discloses the method of claim 1, wherein the CSI comprises indications of data rates supported by a plurality of transmission channels used for data transmission **see page 4 [0041]**.

Art Unit: 2686

Regarding claim 35, Ling discloses the method of claim 33, wherein the SNRs are derived based on spatial processing at the terminals, **see page 10 [0112]**.

Regarding claim 36, Ling discloses the method of claim 35, wherein the spatial processing at a terminal comprises a channel correlation matrix inversion (CCMI) technique or a minimum mean square error (MMSE) technique, **see page 10 [0116]**.

Regarding claim 37, Ling discloses the method of claim 33, wherein the SNRs are derived based on space-time processing at the terminals, **see page 10 [0112]**.

Regarding claim 38, Ling discloses the method of claim 37, wherein the space-time processing comprises an MMSE linear equalizer (MMSE-LE) technique or a decision feedback equalizer (DFE) technique, **see pages 10 and 13**.

Regarding claim 39, Ling discloses the method of claim 33, wherein the SNRs are derived based on successive cancellation receiver processing at the terminals **see page 7 [0086]**.

Regarding claim 40, Ling disclose the method of claim 1, wherein the system implements orthogonal frequency division multiplex (OFDM), **see page 2 [0026]**.

Regarding claim 41, Ling disclose the method of claim 1, wherein the system implements code division multiple access (CDMA), **see page 7 [0075]**.

Regarding claim 42, Ling discloses a method for transmitting data on a downlink in a multiple-access multiple-input multiple-output (MIMO) communication system, comprising: receiving estimated signal-to-noise-plus-interference ratios (SNRs) achieved at a plurality of terminals for a plurality of transmit antennas; selecting one or more terminals for data transmission based on the estimated SNRs; processing data for

Art Unit: 2686

the one or more selected terminals based on the estimated SNRs to provide a plurality of modulated signals; and transmitting the plurality of modulated signals via the plurality of transmit antennas to the one or more selected terminals, and wherein the system is configurable to transmit data via a plurality of operating modes comprised of a single-user MIMO mode, a multi-user MIMO mode, and a mixed mode, **see page 3 [0031] and page 10 [0112] and page 17 [0224].**

Regarding claim 43, Ling discloses the method for transmitting data in a multiple-access multiple-input multiple-output (MIMO) communication system, comprising: receiving channel state information (CSI) indicative of channel conditions for a plurality of terminals; selecting one or more terminals for uplink data transmission; sending information indicative of at least one transmission parameter to the one or more selected terminals; receiving, via a plurality of receive antennas, a plurality of modulated signals from the one or more selected terminals; and processing a plurality of received signals to recover data transmitted by the one or more selected terminals, **see page 7 [0086].**

Regarding claim 44, Ling discloses the method of claim 43, wherein terminals are selected for data transmission based on estimated signal-to-noise-plus-interference ratios (SNRs) for a plurality of available transmission channels **see page 3 [0031].**

Regarding claim 45, Ling discloses the method of claim 43, wherein terminals are selected for data transmission based on RF characterization of a MIMO channel formed by transmit antennas at the terminals and the plurality of receive antennas **see page 1 [0006, 0010].**

Art Unit: 2686

Regarding claim 47, Ling discloses the method of claim 44, wherein the SNRs are derived based on spatial processing, **see page 10 [0112]**.

Regarding claim 48, Ling discloses the method of claim 44, wherein the SNRs are derived based on space-time processing, **see page 10 [0114]**.

Regarding claim 49, Ling discloses the method of claim 44, wherein the SNRs are derived based on successive cancellation receiver processing, **see page 18 [0238]**.

Regarding claim 50, Ling discloses the base station in a multiple-access multiple-input multiple-output (MIMO) communication system, comprising: an inherent scheduler operative to select one or more terminals for data transmission; a controller operative to receive channel state information (CSI) indicative of channel conditions for the one or more selected terminals and to provide one or more controls based on the received CSI; a TX data processor operative to process data for the one or more selected terminals based on the one or more controls to provide a plurality of modulation symbol streams; a modulator operative to generate a plurality of modulated signals for the plurality of modulation symbol streams; and a plurality of transmit antennas configured to transmit the modulated signals to the one or more selected terminals, **see pages 7-8 [0075 & 0086]**.

Regarding claim 51, Ling discloses a base station in a multiple-access multiple-input multiple-output (MIMO) communication system, comprising: means for selecting one or more terminals for data transmission; means for receiving channel state information (CSI) indicative of channel conditions for the one or more selected terminals and for providing one or more controls based on the received CSI; means for

Art Unit: 2686

processing data for the one or more selected terminals based on the one or more controls to provide a plurality of modulation symbol streams; means for generating a plurality of modulated signals for the plurality of modulation symbol streams; and means for transmitting the modulated signals to the one or more selected terminals **see pages 7-8 [0075 & 0086]**.

Regarding claim 52, Ling discloses terminal in a multiple-access multiple-input multiple-output (MIMO) communication system, comprising: at least one front-end processor operative to receive and process at least one received signal to provide received modulation symbols; a RX MIMO/data processor operative to receive and process the received modulation symbols in accordance with a receiver processing technique to provide estimates of modulation symbols in the transmitted signals, wherein the RX MIMO/data processor is further operative to provide channel state information (CSI) indicative of channel conditions for the plurality of transmitted signals; and a TX data processor configured to receive and process the CSI for transmission from the terminal, **see pages 7-8 [0075 & 0086]**.

Regarding claim 53, Ling discloses a terminal in a multiple-access multiple-input multiple-output (MIMO) communication system, comprising: means for processing at least one received signal to provide received modulation symbols; means for processing the received modulation symbols in accordance with a receiver processing technique to provide estimates of modulation symbols in the transmitted signals; means for deriving channel state information (CSI) indicative of channel conditions for the plurality of

Art Unit: 2686

transmitted signals; and means for processing the CSI for transmission from the terminal, *see pages 7-8 [0075 & 0086]*.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Wallace et al., U.S. Patent No. 6,473,467, discloses a method and apparatus for measuring reporting channel state.

Walton et al., U.S. S. Patent No. 6,493,331, discloses a method and apparatus for controlling transmissions of a communications systems.

Lux, U.S. Patent No. 5,274,836, discloses a multiple encoded carrier data link.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joy K Contee whose telephone number is 703-308-0149. The examiner can normally be reached on M (alternating), T & Th, 5:30 a.m. to 2:00 p.m.

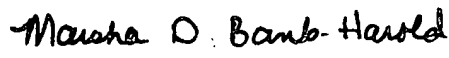
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marsha Banks-Harold can be reached on 703-305-4379. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2686

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Joy Contee

September 29, 2004


MARSHA D. BANKS-HAROLD
SUPERVISORY PATENT EXAMINER
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